THE TREATMENT OF RESOURCE RECOVERY IN SOLID WASTE PLANS

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The Resource Conservation and Recovery Act of 1976 [1] requires that States or regional authorities undertake comprehensive planning for solid waste management, with objectives that include maximizing the utilization of valuable resources and encouraging resource conservation. Prior to the passage of this legislation, California (among other States) already had its own requirements for solid waste planning, each county having being required to submit a plan, with the concurrence of the cities, to the State Solid Waste Management Board (SSWMB) by January 1, 1976. In the hope that lessons for the implementation of the new Federal Act could be learned from the experience in California, this author has reviewed plans obtained from about half of the State's 58 counties, focusing on their treatment of resource recovery*.

CALIFORNIA'S STATE POLICY ON RESOURCE RECOVERY

County solid waste management plans in California are required to be consistent with the State Policy for Solid Waste Management, as adopted by the SSWMB on December 20, 1974. This Policy lists as an objective:

> "To assure that county solid waste management plans include a resource recovery element which factually documents the quantity of solid waste that a county determines it will recover from its waste stream. The plan must include the review of regional or interjurisdictional feasibility of resource recovery systems and in the case of rural counties give special attention to at least source separation of wastes for recovery, all towards the goal of reducing the statewide annual tons per capita of residential and commercial wastes now disposed of in landfills by 25 percent between the years 1972 and 1980".

To meet this requirement, guidelines issued by the SSWMB specify that each plan must include a discussion of materials and/or energy recovery systems, as well as a factual analysis of resource recovery programs if they are not deemed feasible. The analysis must show that a regional resource recovery program was also considered. The establishment of source separation programs

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* The number of plans available for review was limited due to the fact that many counties were late in preparing them; indeed, some have not yet been submitted to the SSWMB and others have so far failed to receive Board approval.

and/or deposit centers for recyclable materials must be considered where appropriate. Provision must be made for periodic review of "the state of the art." In addition, the economic feasibility of the entire plan must be analyzed, showing for the short-term the capital and operating costs of the handling, disposal, and resource recovery systems envisioned in the program. Economic analysis for the medium and long term periods of the plan may be general.

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The plans that were reviewed vary considerably in their treatment of resource recovery. Some contain fairly detailed descriptions of available systems, while in others there are only brief outlines or no descriptions at all. Where systems are described, greatest emphasis is generally placed on "high technology" approaches, involving mechanized front-end separation of materials and fuel, and/or rear-end combustion or pyrolysis. Many of the descriptions appear to be based on reports published by the Council on Environmental Quality [2], the U.S. Environmental Protection Agency [3,4], and/or the SSWMB [5,6]; indeed, some plans quote extensive sections of these reports verbatim, either in their text or in an appendix. Descriptions of alternative "low technology" approaches are generally limited to a mention of either neighbourhood recycling centers where individuals can voluntarily bring their separated materials or salvage operations at landfill sites where manual scavenging is permitted (sometimes as a means of supplementing the wages of landfill operator). Systematic approaches involving, for example, source separation with separate collection are rarely described in any detail.

The plans also vary considerably in their discussions of the economics of recovery systems. Some contain virtually no economic data at all, it being stated simply that the (high technology) systems are very expensive to build and operate. Others quote the actual or, more often, the estimated costs of systems currently in operation or under construction elsewhere, without attempting to adjust these figures according to the particular conditions prevailing in the county concerned. In only a few plans is there evidence of some attempt to explore in detail the likely economics of implementing a system locally.

Virtually all of the plans comment that resource recovery systems are still at an early stage of development and that tremendous uncertainties surround their actual performance and costs when operating at full scale. This is the reason given by some counties for not including any economic data in their plans; instead, they undertake to observe developments and conduct studies in the future as and when these are deemed appropriate.

The availability of assured markets for recovered energy and materials is recognized in many plans as being one of the most critical factors affecting the feasibility of resource recovery systems, but very little detailed exploration of markets is reported. Again, many plans recommend further studies to be done in the future.

DISCUSSION

It is obvious from the plans reviewed (and information obtained from the SSWMB staff regarding other plans) that the State's goal of reducing the per capita residential and commercial solid wastes going to landfill by 25 percent between 1972 and 1980 will not be met. With only three years to go, most counties are still talking about resource recovery in generalities and have failed to do the detailed planning that is necessary before any kind of system can be implemented.

"High technology" resource recovery

It is reasonable to expect a significant difference in the consideration given to high technology resource recovery facilities for residential and commercial wastes by rural counties compared with counties that are heavily urbanized. The former tend to have relatively small quantities of these wastes requiring disposal and in general they are more likely to be able to find suitable landfill sites. The latter are faced with much larger quantities of waste and may have considerable difficulty in locating sites that are technically, economically, and politically acceptable for use as landfills. Recognition of this difference is implied in the State Policy which requires that rural counties "give special attention to at least source separation of wastes for recovery". For many rural counties, a simple "back-of-the-envelope" calculation is sufficient to show that a high technology facility, with its very substantial capital and operating costs, is infeasible.

For the urbanized counties, the situation is somewhat different. It seems clear from the State Policy and the guidelines that the SSWMB intended these counties to examine *in detail* the possibility of establishing resource recovery facilities before 1980. Instead, many counties have prepared documents that are at best described as "plans for plans." However, in fairness to the counties involved, it should be pointed out that even if they had more closely examined the available high technology options, it is likely that many would have reached conclusions no different from those in their present plans. Indeed, an unwillingness to make a commitment at this time to the construction of high technology facilities cannot be considered altogether unreasonable.

Despite the considerable optimism voiced in the past few years regarding the development of mechanized materials and energy recovery systems, it is true to say that the only process to have been fully proven in full-scale, continuous operation is waterwall incineration; however, this is very expensive (especially when very stringent emission control standards must be met) and it is likely to be uneconomic in most places. Front-end separation leading to the preparation of a refuse-derived fuel for combustion in an existing furnace (with appropriate modifications) appears to be a process with significant potential; full-scale plants have recently started up in Ames, Iowa, Chicago, Illinois, and Milwaukee, Wisconsin. The long-term technical and economic viability of the process has yet to be demonstrated.

The development of pyrolysis has been slower than originally anticipated; some unexpected technical problems have been encountered (such as the difficulties in meeting air emission standards, which largely contributed to Monsanto's withdrawal from the demonstration project in Baltimore) and costs have soared (for example, the total project cost of Occidental's 200 ton per day demonstration plant in SanDiego, originally estimated at about $4 million, is now expected to be $14.4 million [7]*). Under these circumstances, and in view of the tight fiscal constraints within which nearly all local governments are currently operating (as well as the low priority generally afforded to solid waste projects) it is understandable that most counties would be unwilling to shoulder the risks involved in making a commitment to a single capital-intensive technology. They would prefer to wait and see first how the new generation of plants will fare elsewhere.

Source separation

In view of the technical and economic uncertainties associated with high technology systems at the present time, increasing attention is being given to source separation as a means of resource recovery. As mentioned earlier, the State Policy in California requires that the rural counties at least consider this approach. Trials both in the United States and in Europe have shown that under the most favorable circumstances, systems involving source separation by households and separate collection of recovered materials can reduce the quantity of waste requiring disposal by other means by as much as 25—30 percent (by weight) [8,9]. Key ingredients of a successful system seem to include household motivation (almost invariably enhanced by extensive public relations efforts), the availability of compartmentalized collection vehicles, and (as in all resource recovery systems) assured markets for the products. The approach has the feature that it is labor rather than capital intensive, which may be a distinct advantage at a time of high unemployment [10]. However, it probably stands the greatest chance of success in smaller communities (up to 300,000 population, suggests one EPA source) where enthusiasm and a commitment to participate may be most readily generated.

The approach being discussed here is different from one that is limited to the establishment of neighborhood recycling centers where individuals can voluntarily bring their separated materials. Systems based on recycling centers have undoubtedly played an important role, not least in raising the public's consciousness about resource problems and providing individuals with an opportunity to make a tangible contribution to the cause of conservation, but they have not on the whole caused a significant and sustained reduction in in the remaining waste stream. In order to achieve this reduction, it is important to have most (rather than just a few) households participating on a

* The total project cost includes design, construction, start-up, and demonstration. Construction has accounted for much of the price escalation.

regular basis; but this is only likely to happen if the occupants can count on regular collection of their separated materials. Regular and assured collection is also essential if long-term agreements are to be signed for the marketing of these materials.

With very few exceptions, counties have failed in their plans to examine in detail the potential for source separation with separate collection. If they were serious about considering this potential, they would at the very least have assessed their ability to deploy compartmentalized collection trucks to pick up the separated materials; in addition, they would have examined the availability of markets for separated materials. Failure to have performed these basic tasks indicates a lack of real commitment.

THE STATE POLICY RECONSIDERED

The poor performance of most counties in pursuing resource recovery options in their solid waste management plans highlights a basic problem: even though the SSWMB has set the goal of a 25 percent reduction in the statewide annual tons per capita of residential and commercial wastes going to landfill by 1980, it has provided no details of how this can or should be achieved and it has given no tangible incentive to the counties to take the necessary action. Simply urging the counties to give "high priority to the recovery of resources" and requiring them to plan for the establishment of recovery facilities if and when these are feasible has not proved sufficient.

It is important to remember that one of the reasons for the State setting an explicit goal is the belief that the present level of resource recovery, as determined by the actions of local solid waste agencies and the private sector, is (by some adopted criterion) "too low." This belief might be held for a variety of reasons: for example, it is widely felt that certain government policies (such as the favorable tax treatment given to the extractive sector and regulated freight tariffs that favor virgin over secondary materials) as well as the environmental "subsidy" given to virgin materials* and the failure of product prices to reflect the costs of disposal, all tend to excessively encourage the extraction and use of virgin materials (and the generation of waste) while discouraging resource recovery [3,11]. In addition, many people feel that the actions of private individuals and firms in the marketplace in making provision for the future may not adequately reflect the preferences of society as a whole (and certainly cannot reflect the preferences of unborn generations); thus the social value of resource recovery as a means of conserving natural resources may not be fully realized [12].

There is no "uniquely correct" level of resource recovery; this is ultimately a matter of value-judgement. One of the roles of the SSWMB is to make such judgements, a role that the Board has performed by deciding on the 25 percent figure now contained in State Policy. However, setting the goal has not in itself removed existing economic and other biases against resource recovery; thus the counties have found themselves having to produce plans that can be shown

*This results from the uncompensated environmental costs of extraction, which are generally greater than those of recovering secondary materials.

to be economically feasible, while at the same time they have been asked to strive for a goal that is based at least partly on non-economic considerations*.

It follows that *if* the State seriously wishes to see its goal achieved, it should do more to make resource recovery an economically viable proposition for the counties. At the very least, the State should act rapidly to remove (or persuade the Federal government to remove) as many as possible of the present biases against recovery. Beyond this, the possibility of providing local agencies with some degree of financial assistance should also be considered. An outright subsidy might be difficult to justify, although it could be argued that this would be a way of paying for benefits of resource recovery accruing to the State (and nation) as a whole rather than to the individual counties. Such benefits would include, for example, a reduction in the reliance placed on imported raw materials and/or the release of scarce natural resources for other uses.

However, a more acceptable method of assisting the counties might be to introduce a statewide scheme of product charges and to return the revenues thus raised to the local communities for use in financing resource recovery and other solid waste services. The product charge concept has been discussed extensively elsewhere [3,13—17], and its possible application in California was recently considered by a committee of the SSWMB [18,19]; the approach could be used to make those responsible for designing and manufacturing the products that ultimately constitute the waste stream also responsible for the costs of handling/disposing of this stream (thus causing these costs to be reflected in the price of the products).

This is not to say that the counties themselves should rest content with their own efforts so far in promoting recovery. As pointed out earlier, most counties show little evidence in their plans of having seriously investigated all available options (particularly those involving low technology) that could prove economically viable even under existing conditions. Furthermore, there is some justification for local communities to consider paying a little more for "disposing" of their wastes by resource recovery than by landfill, since they would thus gain benefits that are not reflected in the economic accounts (for example, the benefits of a reduction in environmental impact).

CONCLUSIONS

In implementing the planning requirements of the new Federal solid waste legislation, particularly in the treatment given to resource recovery, at least two lessons can be learned from the experience in California.

First, it is important to try to ensure that the planning process represents more than a token response to the Act's requirements and intent. In California, most of the county plans discuss resource recovery only in generalities and there are too many promises of studies to be conducted in the

* In this context, "economic" is effectively synonymous with "financial".

future; rarely does it appear that the planning process has included (as it should) a serious attempt to identify all possible options (including low as well as high technology approaches), a detailed evaluation based on pre-defined criteria of those options that might be applicable *within the local context*, and the development of a detailed program for implementation of the options that are selected*. Perhaps the most significant benefit to be gained so far from the consideration of resource recovery in the California county plans has been educational: elected officials, professional staffs, and citizens involved in the planning process now know at least a little more than most did previously about resource recovery options. However, whether this is enough to have made the whole process worthwhile is not at all certain.

Second, it is apparent that simply establishing as a goal the increased utilization of waste is unlikely to persuade local authorities to intensify their resource recovery efforts if these are judged to be uneconomic or only marginally economic. Not only must existing biases against resource recovery be removed to improve its economic attractiveness, but there must also be recognition that the goal is based at least partially on considerations that are not reflected in economic calculations. The question of who should pay for resource recovery ought to be explicitly addressed.

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*Some unnecessary duplication of effort could have been avoided if the State had more thoroughly researched and evaluated alternative technologies and provided this information in common to all counties *before* they began their planning.

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